Claims

1. A bone system model comprising a mineralized matrix and osteoblasts, characterized in that the osteoblasts are deposited onto the matrix so as to form a layer at confluence and/or nodules, and the osteoclasts are deposited onto said layer and/or said nodules.

2. The bone system model as claimed in claim 1, characterized in that it mimics the human bone system.

3. The bone system model as claimed in claim 1 or 2, characterized in that the mineralized matrix is a matrix composed of collagen and of calcium phosphate and/or calcium phosphate derivatives.

4. The bone system model as claimed in claim 1, 2 or 3, characterized in that the mineralized matrix is a matrix composed of collagen and of hydroxyapatite.

5. The bone system model as claimed in any one of claims 1 to 4, characterized in that the ratio of osteoclasts to osteoblasts is approximately 1/10 to 1/25.

6. The bone system model as claimed in any one of claims 1 to 4, characterized in that the osteoblasts and/or osteoclasts deposited are genetically modified.

7. A method of selecting a matrix for reconstituting a bone system model, characterized in that a matrix is subjected to the following process :

- depositing of a layer and/or nodules of osteoblasts at confluence onto the matrix,
- depositing of isolated osteoclasts onto the layer and/or the nodules,

- observation of the invasion of the osteoclasts through the layer and/or the nodules of osteoblasts,
- selection of the matrices on which the osteoclasts are located between the matrix and the layer and/or the nodules of osteoblasts.

8. The method of selection as claimed in claim 7, characterized in that it also comprises a step of observation of the resorption of the matrix, and in that the matrices on which a resorption is observed are selected.

9. Artificial matrices selected using the method as claimed in claim 7 or 8.

10. A bone system model that is cancerous, characterized in that the model as claimed in one of claims 1 to 6 is used, modified as follows :

- the osteoblasts and/or the osteoclasts are derived from normal, ovariectomized and/or orchidectomized animals,
- cells derived from cancer cell lines are also deposited.

11. A bone system model affected by osteoporosis, characterized in that the model as claimed in one of claims 1 to 6 is used, modified as follows :

- the osteoblasts and/or the osteoclasts are derived from normal, ovariectomized and/or orchidectomized animals, the osteoporosis then being induced chemically *in situ*, and/or from knock-out animals which are transgenic for any molecules for which the modulation of expression induces a decrease in bone mass.

12. A bone system model affected by osteomalacia, characterized in that the model as claimed in one of claims 1 to 6, is used modified as followed :

- the osteoblasts and/or the osteoclasts are derived from normal animals, the osteomalacia then being induced chemically *in situ*, and/or animals that are knock-out for the vitamin D receptor or for any other molecules capable of inducing osteomalacia.

13. A bone system model affected by rheumatoid arthritis, characterized in that the model as claimed in one of claims 1 to 6 is used, modified as follows :

- the osteoblasts and/or the osteoclasts are derived from normal animals, the rheumatoid arthritis then being induced chemically *in situ*, and/or from knock-out animals which are transgenic for any molecules capable of inducing rheumatoid arthritis or from animals having been given injections of collagen type II, or of any other substances capable of inducing an articular inflammation mimicking rheumatoid arthritis.

14. A bone system model affected by osteomyelitis, characterized in that the model as claimed in one of claims 1 to 6 is used, modified as follows :

- at least one bacterial or viral strain chosen from *Enterobacter cloacae*, staphylococcus aureus, beta-hemolytic streptococcus A, *Haemophilus influenzae* type b, salmonellae, *Pseudomonas*, and/or pneumococci is added to the medium.

15. The use of the models as claimed in claims 1 to 6, 10 to 14, for testing the screening for therapeutic molecules.

16. A test for tumor cell aggressiveness, characterized in that tumor cells are taken from a patient by biopsy, and the cells taken are deposited into a model as claimed in any one of claims 1 to 6, 11 to 14, according to the pathological state of the patient, in order to observe the development of secondary bone cancer.

17. A test for the toxicity of a chemical compound, characterized in that at least one concentration of said compound is tested on a model as found in any one of claims 1 to 6, 11 to 14.